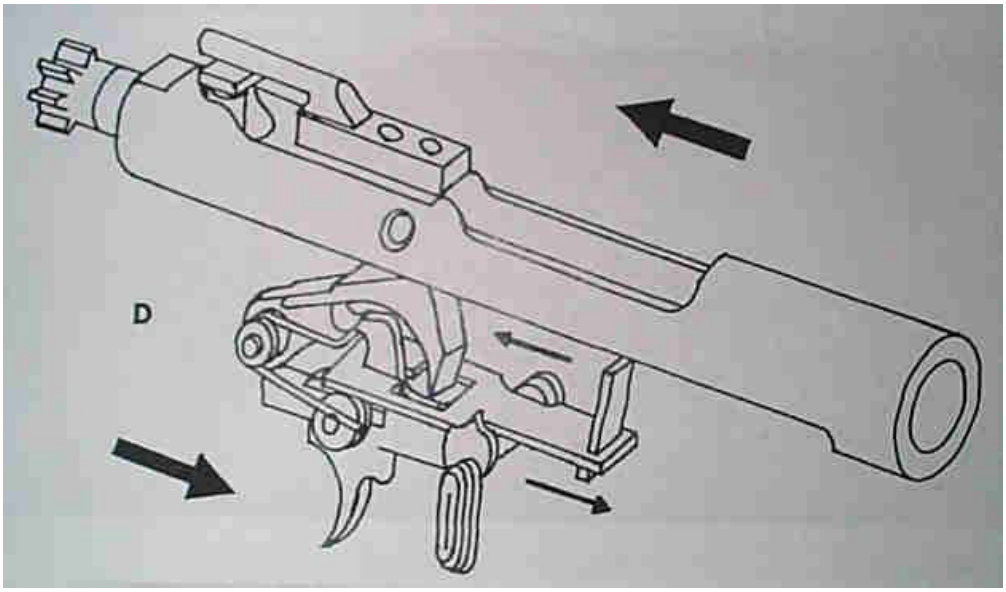
The SWD Lightning Link Page

Written by www.Quarterbore.com

The SWD Lightning Link (SWD Auto Disconnector or Auto Connector) is one of those unique solutions where someone happened to look at the operation of the AR-15 and how the various parts of the operating systems work together to find an easy way to convert a semi-automatic firearm into a fully automatic weapon. Please understand that it is illegal for a US Citizen to build one of these units without special licenses and the purpose of this page is to discuss how the Lightning Link works and not to provide guidance on how to build one.

In normal semi-auto operation the hammer is cocked by a rearward movement of the bolt carrier, as the carrier moves forward, the hammer is caught and held in the cocked position by the sear located on the forward part of the trigger catching in the sear notch, on the hammer. If you hold the trigger after a shot's fired the sear will not catch in the hammer's sear notch when the hammer cocks because the sear is depressed below the arc of the hammer notch.

This happens because the trigger is being held back by the hook on the disconnector that is tipped forward and in position to catch the hammer, stopping it from following the bolt carrier forward. When the trigger is released, it allows the hammer to slip from under the disconnector hook and to be caught by the trigger sear in the hammer sear notch. Making it necessary to pull the trigger for each shot. As long as the trigger is held back, the sear is held below the arc of the hammer notch. The only thing holding the hammer in the cocked position is the disconnector. The Lightning Link accomplishes full-auto fire by pulling the disconnector to the rear forcing it to release the hammer.



The lightning link is installed by removing the rear take down pin and pivoting the upper by the front pivot pin. The lightning link is then dropped inside the lower with the paddle pointing up, making sure the LL loop goes in front of the disconnector hook as shown in the image above. I have read that the gun might be tricky to close as the paddle has to fit inside the gap between the upper and the bolt carrier. One trick that might help is to point the muzzle of the rifle down as you close the upper receiver. I also understand that sometimes it may be necessary to shave some steel from the carrier to make room for the link. Care must be taken not to remove too much material as obviously this would affect the operation of the link.

INSTRUCTIONS FOR THE INSTALLATION, OPERATION, AND REMOVAL OF THE

S.W.D. — AR-15 AUTOMATIC-CONNECTOR

S W D, Inc.
1872 MARIETTA BLVD.
ATLANTA, GA 30318

WARNING: These Automatic Connectors are designed to be used in **COLT, AR-15s ONLY!** Your gun must have all COLT AR-15 internal parts! They will not function with any M-16 parts whatsoever!

COBRA

— IMPORTANT NOTICE — Before attempting the installation of your Automatic Connector, it is necessary that you read CAREFULLY and understand completely these simple instructions. (In some cases, it may be necessary to use the aid of a paper clip or other small straight object.) NOTE FIG. 5 when reading these instructions.

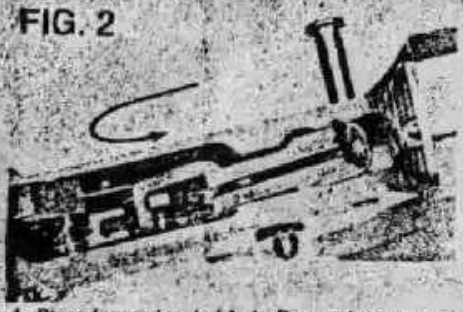
FIG. 1

1. Check your AR-15 to make sure it is unloaded. Remove magazine and be certain there is not a live round in the chamber.

2. Holding your AR-15 in a level upright position, disengage the receiver lock pin and gently allow the receiver and barrel to tilt forward.

3. Place the selector lever in the "fire" position. With one thumb on the hammer, pull the trigger with the other hand and gently ease the hammer forward.

FIG. 2



4. Place forward end of Auto-Connector over and in front of AR-15 disconnector. (SEE FIG. 2) The large square opening is the front of the Auto-Connector. With your thumb, recock the hammer.

FIG. 3

5. Tilt entire gun to the rear, seat Auto-Connector in the bottom of the frame cavity and completely to the rear of frame. Auto-Connector trip must be resting against back of frame. (SEE FIG. 3)

FIG. 4

6. With the weapon still tilted to the rear, lower the upper receiver to position shown in FIG 4. While still in this position, disengage charging handle from lock position and draw slightly to the rear causing bolt carrier to force recoil buffer to the rear and leaving enough gap between bolt carrier and receiver to allow easy insertion of Auto-trip (SEE INSERT PHOTO

FIG. 5

7. Without moving the upper receiver and lower frame, and keeping the charging handle pulled slightly to the rear, tilt the gun slightly on its side. In this position, begin tilting the gun forward. The Auto-Connector trip will fall forward and rest against the upper receiver lock lug. (SEE FIG. 5)

It may be necessary at this time to employ the aid of a straitened paper clip or other thin strait object to aid in the positioning of the Auto-trip into the gap between the bolt carrier and upper receiver.

FIG. 6

8. At this time, the upper receiver may be closed completely with the lower frame and the lock pin pushed through to secure upper and lower halves. Be certain that the Automatic-Connector trip has engaged opening between bolt carrier and upper receiver. (SEE FIG. 6)

FIG. 7

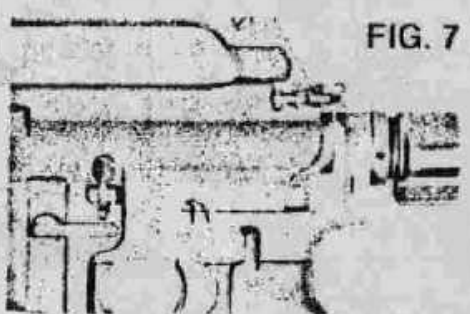
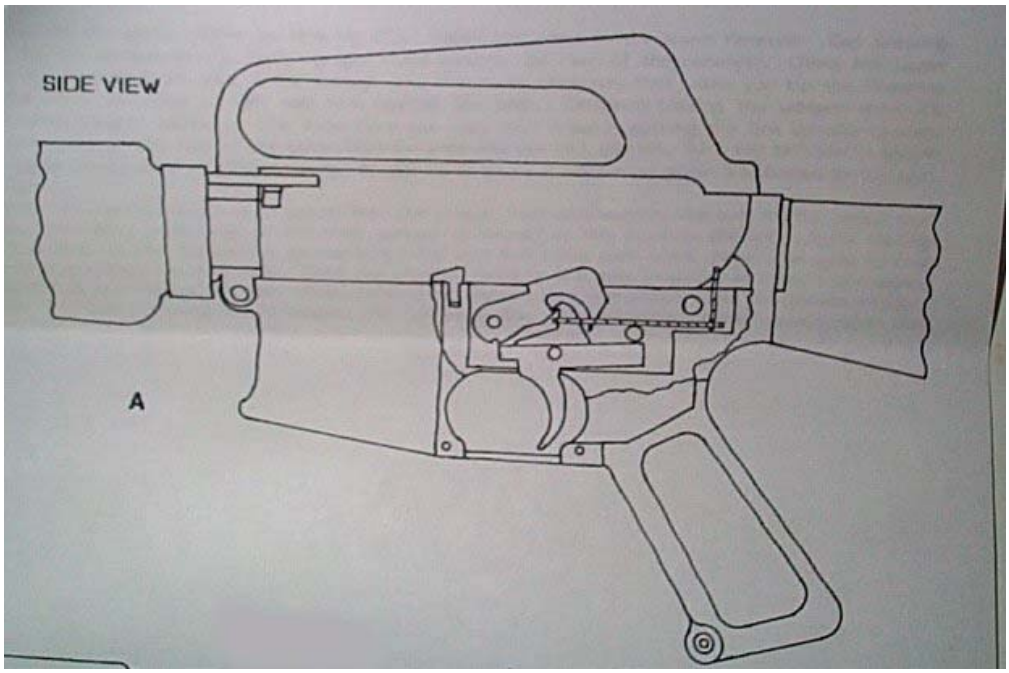


FIGURE 7 showing proper position of Automatic-Connector after installation, by means of a cutaway view. Following these instructions carefully, the installation of your Automatic-Connector can be accomplished with the first try.

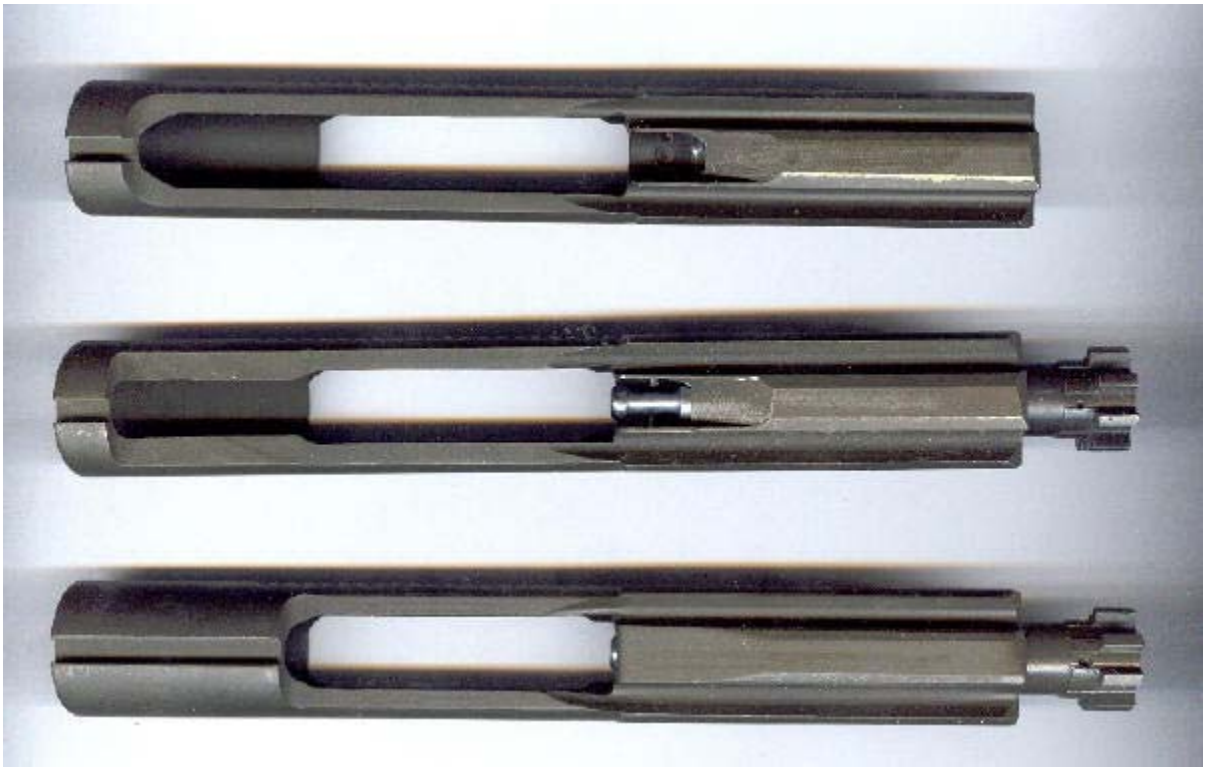
Once you have properly installed your Automatic-Connector in your COLT, AR-15, the weapon is ready to be fired fully-automatic. As this is a drop-in unit, your AR-15 will have no provisions for select fire. However, should you desire to return your gun to semi-automatic simply remove the Auto-Connector in the reverse order from which you installed it. The rate of fire for your COLT, AR-15 will be about 700 to 750 rounds per minute.

In operation the takedown pin post acts as a fulcrum point. When the bolt carrier strikes the top of the links paddle and the lower end is rocked to the rear, moving the body of the link backward about 1/16 inch, releasing the hammer from under the disconnector hook.



As long as the trigger is held back the rearward movement of the bolt carrier will cock the hammer under the disconnector hook. The forward movement of the carrier will strike the upright paddle of the link just as the bolt locks in battery, releasing the hammer, and firing the weapon. When the trigger is released, the sear will stop the hammer in the cocked position negating the operation of the disconnector and the Lightning Link.

223 Bolt Carrier Groups and the SWD Auto Connector



- Top: Normal AR-15 Carrier
- Middle: Colt "SP1" style Carrier
- Bottom: M-16 Carrier

The rounded AR-15 Carrier (top) has more material at the rear of the carrier as can be seen in the photo above when you compare it to the Colt SP-1 style carrier in the middle. When you try to use one of the top carriers with a Lightning Link, the link will hit the rounded edge at the rear of the carrier before the carrier closes into battery allowing the rifle to fire. NOTE: This is a very dangerous situation and anybody with a link needs to read the timing section that follows to prevent a KABOOM!

The SP-1 carrier, the one in the middle, with it's square back is the carrier that the lightning link was designed for. This style carrier allows the bolt to nearly close before the link is hit tripping the disconnect. A person would still want to check their timing before using live ammo but this is the carrier that will work with the link.

The bottom carrier in the photo above, the M-16 carrier will not work with the link but I have included it on this scan so you can see how the SP-1 carrier was made by cutting down an M-16 carrier. It would be possible to make a SP-1 type carrier from a M-16 carrier or simply mill an AR-15 carrier to the proper profile. Also, following is a photo of the newest style Colt "Open" Carrier that was designed specifically to prevent the use of

the Lightning Link. As you can see, the Colt "Open" carrier has no trip surface that will work with the link.

9mm Bolt Groups and the SWD Auto Connector

- Top: Normal RRA M-16 Compatible 9mm Bolt
- Bottom: RRA 9mm Bolt modified to work with Lightning Link

From the discussion of the 223 bolts above, it should be fairly clear what is needed to make other bolts work with the SWD Auto Connector. In the photos above I am

showing my RRA 9mm bolts. The top bolt is a new RRA 9mm bolt that will work with an AR-15 or M-16. The rounded area in the slot in the bottom of the bolt is designed for a GI Auto Sear to function and the trip surface is in the proper location for the M-16 or DIAS.

To make a 9mm bolt compatible with the lightning link, one needs to mill the carrier as shown at the bottom of the photo above. In essence, all that is done is to mill the carrier to emulate the rear surface of the SP1 carrier as shown in the photo above of the 223 carriers. When performing this work, it is essential to test the timing of the Lightning Link and the directions that follow will give you an idea of how to confirm your timing is acceptable.

Following are two photos that show the 9mm bolt that was modified for the Lightning Link inserted into a upper receiver. The top photo shows the 9mm bolt pulled to the rear while the bottom photo shows the gap between the 9mm bolt and the rear takedown lug that is normal with a carrier designed to be used with the link.

Registered Lightning Link Timing made easy

Provided by Dano523 of AR15.com

With the link in the rifle, hold the trigger back and cock the action, then slowly ride the cocking handle all the way forward/closed. The hammer should not release. Then while still holding the trigger back, pull the cocking handle back 1/2", then release and let the carrier slam forward. The hammer should be released.

The link cams the disconnector free from the hammer, but due to the slight slop in the design, the carrier must slightly free run for the link to work correctly. If you are able to get the link to release while slowly riding the cocking handle down, then the release timing will be too advanced, and the rifle cycle rate will tend to be a bit too fast.

In regards to adjusting timing, you can always just change the paddle/thickness, but to fine tune, removing a bit of metal from the carrier ledge or disconnector contact point is a simpler way, especially if you are installing a modified burst FCG, and want the link to work with it.

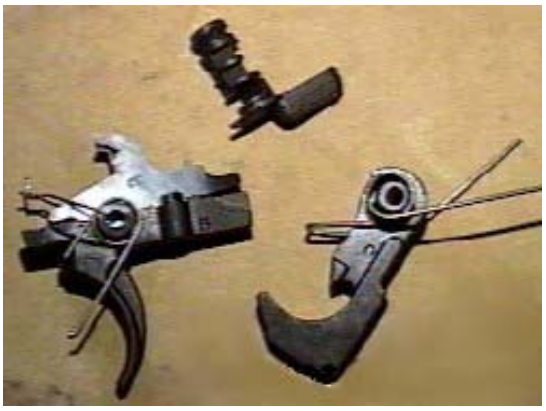
The quick way to time for the modified burst kit is to use a thicker paddle and enlarge the notch in the disconnector (right side burst disconnector) to re-time the link to the FCG kit. The center disconnector should never contact the link; it is controlled/camed out of play when the selector is set to auto, and keeps the hammer retained when the selector is set to semi.

Note: Never file the link; it's the high priced item. Always adjust the parts that can be replaced at will from the box of spare parts.

The Selective Fire Lightning Link

One complaint I've ever heard about the Lightning Link is that the link converts the firearm to full auto only. This issue was solved by a clever idea that Scott Bell came up with while he was working with John Norrell in about 1990. The solution, which was worked out in a few hours one afternoon, was to use modified parts from an M16A2 fire control kit to control the mode of operation of the Lightning Link.

Lightning Link Selective Fire Kit

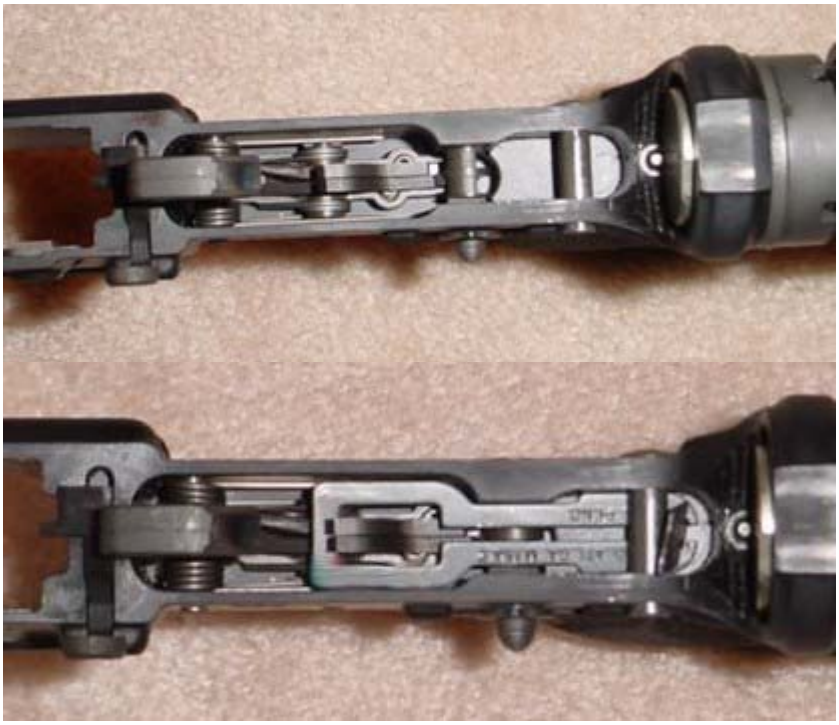


The M-16A2 trigger group has a pair of disconnects that allow the the selector to use one or the other disconnector during firing. The selective fire kit as Scott Bell and John Norrell developed it, uses one disconnector that has a notch cut into it preventing the LL from tripping it, while the second disconnect does not have this notch and is tripped by the link causing full auto operation as with the standard AR-15 disconnector.

Lightning Link with Selective Fire Kit installed in AR-15

Selective Fire Kit with link removed

Special thanks to "Chris" for the photo above!



Special thanks to "Chris" for the photos above!

AR-15 Lowers that will work with a Lightning Link

The following is information from Circuits, a member on AR15.com who is a Class 07 Firearms manufacturer and a Class 02 SOT NFA weapons manufacturer.

To use an SWD Auto Disconnector with an AR-15s it is essential that there is at least an 1/8" clearance under the takedown pin post for a lightning link to work. All Bushmaster, Sendra, Essential Arms, and some PWA preban lower receiver will work perfect without modification. Some early Colts such as pre-89 SP1 and Sporter II will also work perfect without modification. Later Colts (post-90 to mid 90's) will also work perfect if the pinned-in sear block is removed.

Most Olympic Arms lower receivers may need internal filing to fit a DIAS or a lightning link. This is because they are not built to the same specifications as the early Colt or bushmaster, and are too narrow by a few 100ths of an inch to fit a DIAS or link. Preban Eagle Arms lowers will fit a DIAS but not a link in Circuit's experience because it is slightly too large internally to support the link and let it work.

Other lowers such as late-90's post ban Colts have unmachined web sear block and high shelf while Postban Eagle Arms, Armalite, ASA, and some PWA prebans and all PWA postbans have a high shelf that will need to be milled out to allow a lightning link to work.

Advantages of the Lightning Link

1. Relatively inexpensive way to get a full auto M-16
2. Selective fire capability.
3. Can be removed from weapon and stored in a small secure place.
4. Cartridge conversions are available.
5. Less Expensive then DIAS or Registered Receiver with the benefits of the Modular nature of the AR-15 platform.

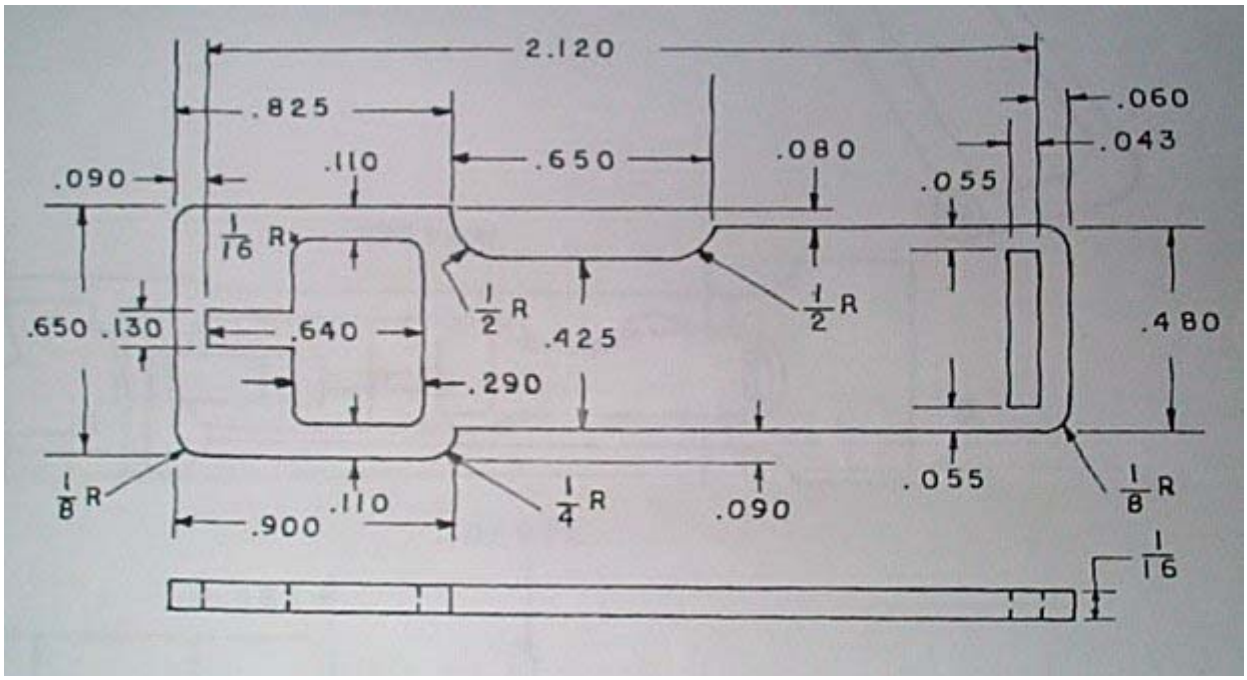
Disadvantages of the Lightning Link

1. Physically can wear out over time.
2. Getting a link to work with a Ciener 22 conversion can prove a difficult challenge.

Drawings with Lightning Link Specifications

LEGAL NOTE: The following provides the specification and information that could be used to make a functional Lightning Link. This information is provided for "EDUCATIONAL USE ONLY" or for use by those that have the appropriate legal licenses or those that live in countries where they can build these legally. It is illegal for anybody in the United States to manufacture a Lightning Link regardless of whether or not you own an AR-15, M-16 or any other weapon. A Lightning Link is classified as a Machine Gun ALL BY ITSELF and you can go for jail for building or owning one even if you do not have ANY GUNS!

The material that follows is intended so that a viewer can see how these are built and appreciate the system... NOT TO BUILD AN ILLEGAL devise. I assume no responsibility if anybody makes something from the following information and hurts him or herself, destroys a weapon, or gets arrested and/or fined. You have been warned!



Construction

The drawings show the shape and give the dimensions for a Lightning Link that fits in the Colt AR-15. If it's to fit in an after market lower receiver it may be necessary to

change the outside dimensions. Either way, all that's really important is that it fits inside the receiver and can move back and forth about 1/16 inch.

When building the Lightning Link without a milling machine I find the simplest way is to cut the long piece to the length and width. Next center punch and drill a 1/8 inch hole at each corner of the large oblong hole at one end. With a dremel tool and banded cutoff wheel cut out the material between the four holes you drilled.

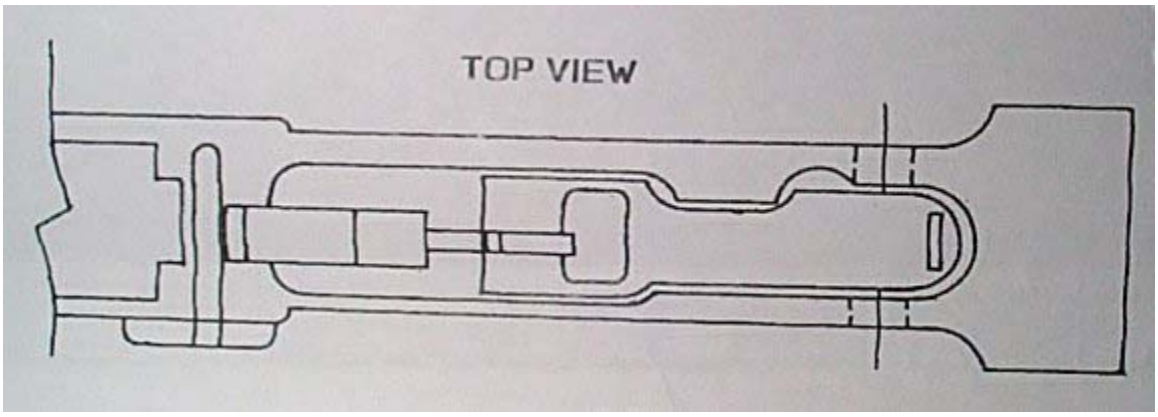
Next center punch and drill a 1/8 inch hole so you can cut out the .130 wide tail that extends out of the oblong you have already cut. NOTE.... Do not square off the end of the .130 cut at this time.

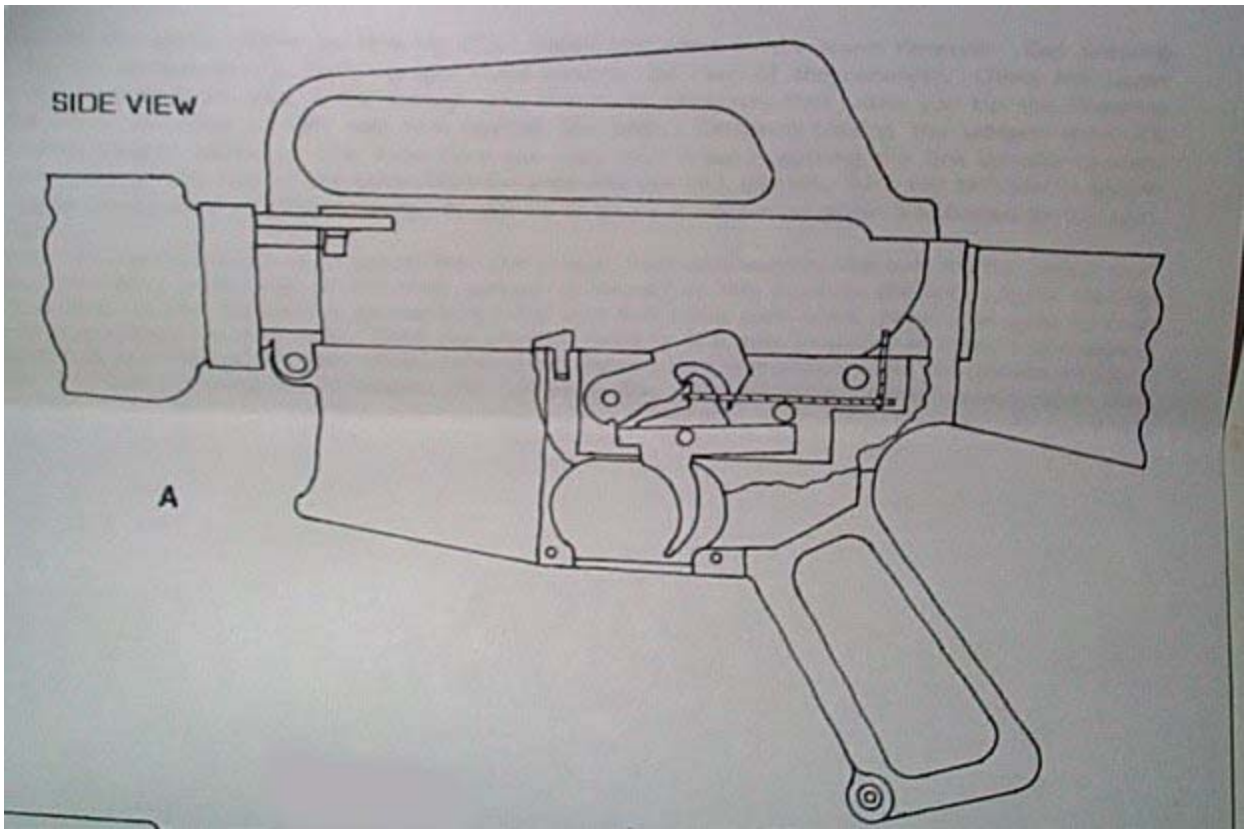
Center punch and drill a 1/32 inch hole at each end of the .043 slot at the other end of the part. Cut the slot out with the dremel too and bonded cutoff wheel. Square the ends and finish the slot using a needle file.

Clean up the oblong hole and .130 wide cut with a small file. NOTE.... Now’s the time to square the end of the .130 cut. CAREFUL.... Don’t get carried away. The distance between the front {squared end} of the .130 cut and the rear face of the .043 slot cannot be any more that 2.120.

File or grind the outside edges to shape until it fits into the lower receiver without touching the inner receiver walls.

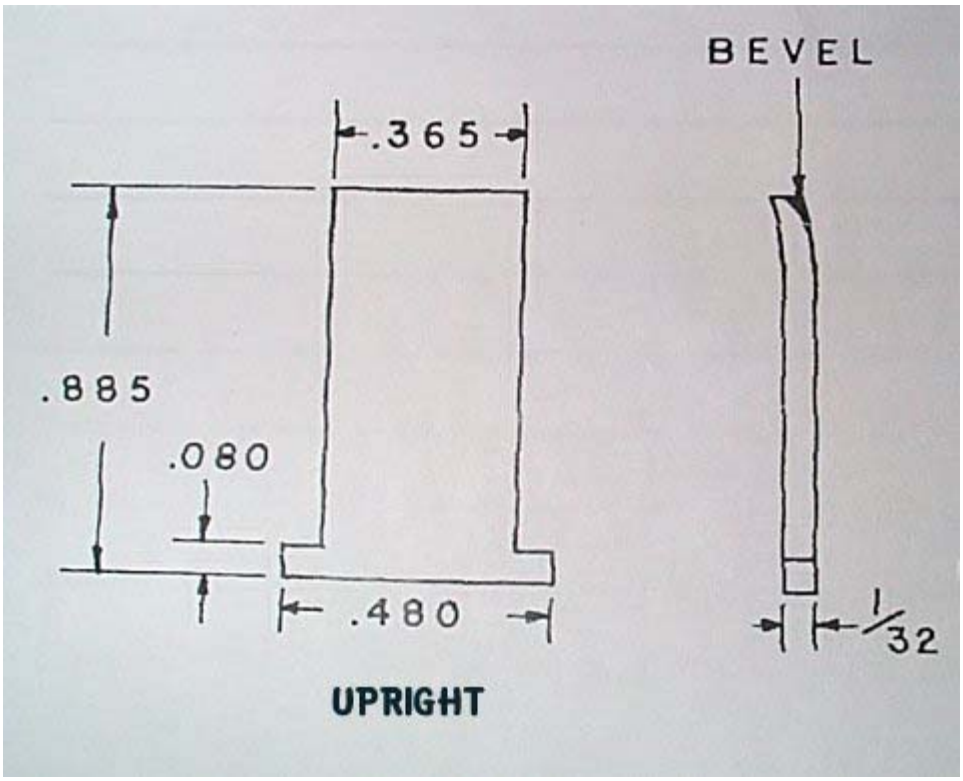
To check the link for fit and function, drop it over the hook on the disconnector, refer to the following drawings.





Hold the trigger back and cock the hammer. It will be caught by the disconnector hook. Now place a scribe or anything that will fit into the slot at the rear of the link and pull it toward the back of the receiver, the hammer should fall. If it did, keep holding the trigger, recock the hammer and do it all again. As long as you hold the trigger back, the link will release the hammer. When you release the trigger, the link can no longer release the hammer from the cocked position. If the link would not move back far enough to pull the disconnector hook off the hammer, find out what's stopping it and correct the problem.

Cut the upright part to length and file or grind it to shape. File a slight bevel at the to rear of the upright.



Assembly

Refer to drawing A or the instructions from SWD. Install the parts in the lower receiver. Tip the weapon so the links upright rests against the rear of the receiver. Close the upper until the take-down pin post is far enough into the lower receiver, that when you tip the firearms muzzle down the links upright can rest against the post. Continue closing the weapon until it's completely closed. NOTE....This first time you may have trouble getting the link upright to slide in place between the rear of the take-down pin post and the bolt carrier. All I can tell you is wiggle and jiggle things until it goes into place. It will fit in place much easier after its shaped by the bolt carrier.

After the take-down pin is in place, hold the trigger back and operate the bolt carrier about five times. The bend in the top of the links upright is formed at this time by the bolt carrier hitting it. See photo at the bottom of this page. Be sure to let the bolt slam with full force each time. Now's the time to find out if everything's working right. Cock the weapon, point it in a safe direction and pull the trigger. You should hear the hammer fall. Keep holding the trigger, cock the weapon, and release the trigger. Pull the trigger, nothing should happen, the Lightning Link will have released the hammer when the bolt carrier closed.

Test Fire

Load two rounds in the magazine. The first will fire when you pull the trigger, the second will fire automatically. Check the brass for any problems. If all's well, load five rounds and fire. If all goes well, load her up and let her rip.

Also See:

AR15 to M16 Conversion Manual:

The Conversion Manual for the AR-15 includes information on how someone would make a true M-16 Conversion from an AR-15, the DIAS, as well as the Lightning Link. You will note that the information in the PDF File is the same as the information presented above. Note that all of these conversion methods are illegal to perform are are supplied **for educational use only**!

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